Developing Good Programming Practices

Organized by University of Manitoba IEEE

Topics to be Covered (Agenda)

- Better commenting for variable declarations, functions/methods, and classes
- Naming conventions for variables, functions/methods, and classes
- Basics of code testing through manual and automated techniques
- Line-by-line debugging (via Rubber Ducky debugging method)
- Separating aspects of code (imports, constants, etc.)

Approximated length: 60-70 minutes. Extra 20 minutes at end for questions.

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Getting the Most From Online Workshops

- Take notes!
- Ask questions in Google Meet chat!
- Follow along if possible! (Use external monitor if possible.)

Take advantage of this UMIEEE workshop to the greatest extent possible!

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Understanding Good Practices vs. Bad Practices

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Variable, Function, and Class Naming Conventions

- **snake_case**: Words are delimited by an underscore.
  - `variable_one`
- **PascalCase**: Words are delimited by capital letters.
  - `VariableOne`
- **camelCase**: Words are delimited by capital letters, except initial word.
  - `variableOne`
- **Hungarian Notation**: Describes variable type or purpose at start followed by describer indicating variables function.
  - `arrDistributeGroup`
  - `sUserName`
  - `iRandomSeed`

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Whitespace and Tabbing: With Ample Whitespace

```
client.on("message", (message) => {
    if (message.content.toLowerCase().startsWith(prefix + "clear")) {
        const clear = async () => {
            message.delete();
            message.channel.bulkDelete(
                await message.channel.messages.fetch({ limit: 99 })
            );
        };
        clear();
    }
});
```

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Whitespace and Tabbing: With Minimal Whitespace

```
client.on("message",e=>{if(e.content.toLowerCase().startsWith(f+"clear")){(
async()=>{e.delete(),e.channel.bulkDelete(await
e.channel.messages.fetch({limit:99}))})()}});
```

JavaScript Code Snippet: Mahyar Mirrashed © 2020

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Understanding: Commenting the Code

Symbols used by different programming languages to comment code:

- Single-line comment symbols
  - // (C, C++, C#, Java, Rust, JavaScript, Verilog, etc.)
  - # (Python, etc.)
  - -- (SQL, etc.)
  - % (LaTeX, Verilog, etc.)
- Multi-line comment symbol pairs
  - /* */ (C, C++, C#, Java, Rust, etc.)
  - ”””” ”””” (Python, etc.)

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Understanding: Overall Code Layout

1) Imports
2) Constant declarations
3) Method/Function and class declarations

Important: all non-intuitive constants should be declared in the constant declarations section of your code.

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Testing Your Code

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Types of Testing

- Normal Input
  - What you expect
- Edge Cases
  - Rare, but valid input
- Advanced: Memory Leaks

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Sorting Example

```
void sort_ints(int *int_array, int size)
{
    //
}
```

- What are the normal inputs?
- What are the edge cases?
- Is NULL a valid test case?
    - What should you do it NULL is passed?

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Automated Testing

- Manual Testing
  - Easy, but very tedious
- Automated Testing
  - Scaffolding that checks if the correct output is given
    - Print to STDOUT if test is passed
  - More upfront work, easier in the long run

```
ryan@ryan-MS-7B93:~/Downloads$ ./tess
Test passed of unsorted list
Test passed of sorted list
Test passed of empty list
Test passed of revese sorted list
Total tests: 4
Passed tests: 4
ryan@ryan-MS-7B93:~/Downloads$
```

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Short Comprehension Quiz (Test Yourself)

Understanding: Variable, Method, and Class Naming

Can you identify the variable naming convention?

A. `strawberryShortcake`
B. `sCoordinateOutput`
C. `hex_to_bin`
D. `ExpressionTree`

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Understanding: Commenting

Which of the following is true?

A. Comments cannot be too long.
B. Commenting is only important for the programmers.
C. Comments should always be written in full sentences.
D. Comments is a way of creating properly understandable code.

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Understanding: Spacing and Readability

Which of the following is true?

A. It is important to keep consistent spacing throughout code.
B. If the final product is being minified, the spacing/readability does not matter.
C. Tabs and spacing are optional in all languages.
D. Spacing and readability is not important for code that is never published.

Practical Approach via Live Code Correction

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Open the Python Code

If following along, please open the Python file that was emailed to you before this event. The link will also be shared in the chat.

This Python code is very error prone, so we will be fixing it up!

If following along, please open up the Python file in your preferred IDE.

This would be Spyder for most COMP 1012 students.

For other students, it is recommended to follow along in VSCode if that is already set up on your computer.

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Practical Demonstration

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Future UMIEEE Workshops

- Smart Code Development with VSCode
- Intermediate Python Development
- Introduction to Report Writing with LaTeX
- Introduction to Git
- Functional-based vs. Object Oriented-based Programming Paradigms
- Introduction to Embedded Systems Programming
- Introduction to Circuit Design Conversion onto Breadboard

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Closing Remarks

Consider joining UMIEEE!

edu.ieee.org/ca-umieee/about-ieee/join-ieee-2/

Questions?

Thanks for attending our workshop!

We will now take any additional remaining questions! (Please place in the chat.)

If you have more questions, join UMIEEE.